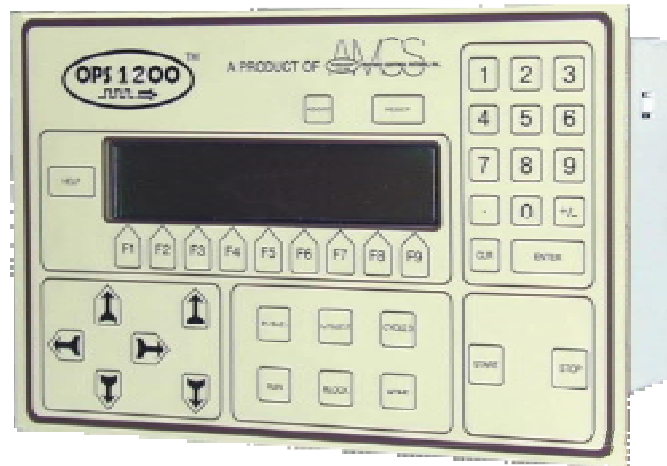




p/n YPM08127

OPS1200 User's Manual

Effective: October 7, 2002



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CHANGE NOTICE

OPS1200 User's Manual Version Change:

From: Version 1.00, Dated 6/01/2001

To: Version 1.01, Dated 12/16/2001

1. Miscellaneous
Combined Firmware Addendum and Hardware Manual.

Added Contrast command.

Added Technical Specification.

Added display and keyboard figures.

OPS1200 User's Manual Version Change:

Release: Version 1.00, Dated 6/01/2001

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INTRODUCTION

This document provides firmware command and hardware connection information for the Acroloop OPS1200 complete motion box.

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CHAPTER 1
OPS1200 DISPLAY AND KEYBOARD

DISPLAY

The display on the OPS1200 is an LCD display arranged in a 4 line by 40 digit format. The lines are numbered 0, 1, 2, and 3 from top to bottom. The columns are numbered 0, 1, 2, ... 39 from left to right. There are two commands available to control the cursor position. "VPOS" controls the vertical positioning and "HPOS" controls the horizontal positioning. these commands are described in detail in Chapter 2 of this manual. To send display characters to the LCD screen, the "PRINT" command is used.

DISPLAY

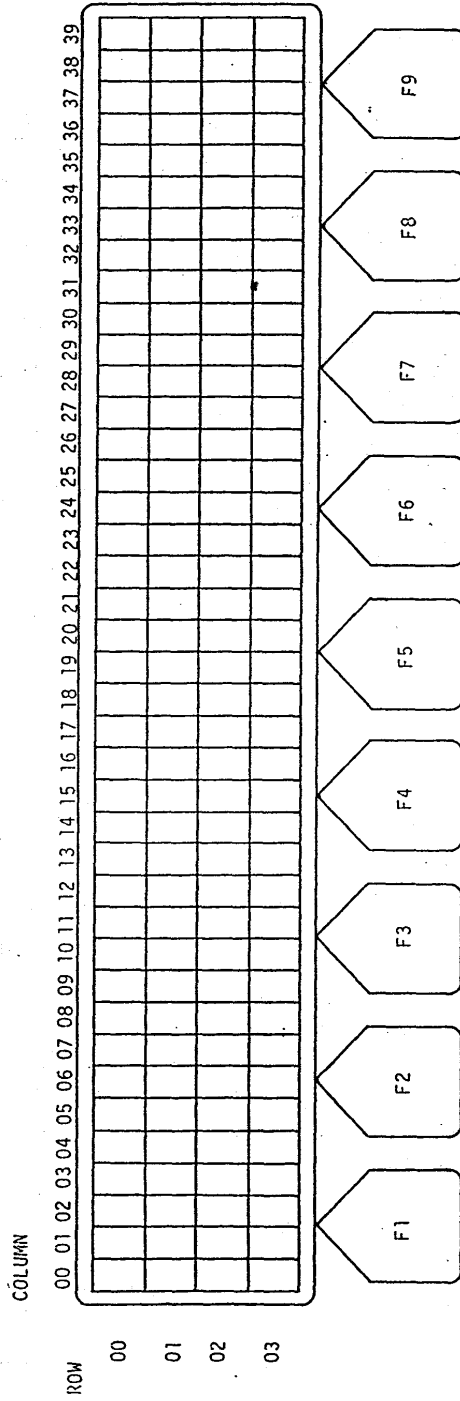


Figure 1.1 OPS1200 LCD Screen Worksheet

DISPLAY

		D ₃ D ₂ D ₁ D ₀ (Low order data bits in HEX)																
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
D ₇ D ₆ D ₅ D ₄ (High order data bits in HEX)	0																	
	1																	
	2		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
	3		0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
	4		@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	5		P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
	6		ˆ	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	7		p	q	r	s	t	u	v	w	x	y	z	{		}	~	
	8																	
	9																	
	A		æ	¢	¥	£	℞	×	÷	±	Ä	Ö	Ü	ä	ö	ü	ß	¨
	B		°	ñ	¿	ñ	ı	ƒ	â	à	é	ê	è	ı	ï	ô	û	ù
	C		½	¼	ℓ	~	□	ò	ƒ	é	Æ	ø	ä	æ	ø	ı	ä	□
	D		→	←	↑	↓	↖	↗	↘	∞	π	Σ	σ	μ	θ	Ω	∞	
	E																	
	F																	

Figure 1.2 OPS1200 Displayable Character Set on the LCD Screen

KEYBOARD

The membrane keyboard is arranged in an easy to use manner with separate numbers keys, directional jog keys, 9 soft keys for menu selection and various other keys. A total of 40 keys are available. All of the keys have tactile feel. The keyboard input is bully buffered and all of the keys can be sensed by using the “INKEY\$” command or the “INPUT” command. These commands are explained in the Acroloop User’s Guide Part 1. Both the key press and the key release codes are returned as separate codes.

KEYBOARD

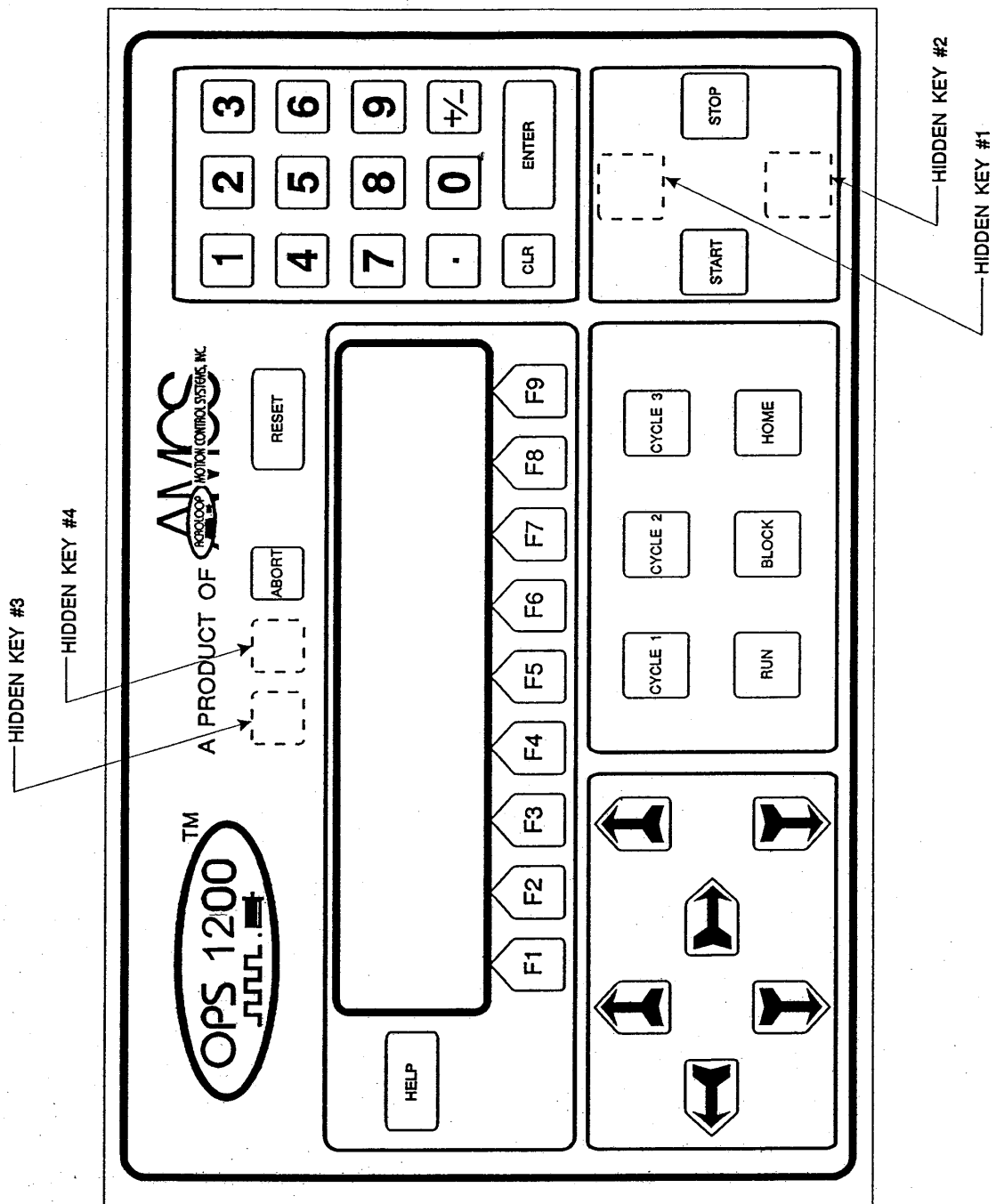


Figure 1.3 OPS1200 KEYBOARD

KEY CODES

The key codes are given in Table 1.1. There is a separate code for the key when it is pushed versus when it is released.

<u>KEY LEGEND</u>	<u>CHARACTER</u>	<u>CODE (HEX)</u>	<u>RELEASE CODE (HEX)</u>
F1	A	65 (41)	193 (C1)
F2	B	66 (42)	194 (C2)
F3	C	67 (43)	195 (C3)
F4	D	68 (44)	196 (C4)
F5	E	69 (45)	197 (C5)
F6	F	70 (46)	198 (C6)
F7	G	71 (47)	199 (C7)
F8	H	72 (48)	200 (C8)
F9	I	73 (49)	201 (C9)
HELP	?	63 (3F)	191 (BF)
ABORT	ESC	27 (1B)	159 (9F)
UP Y+	Y	89 (59)	217 (D9)
DOWN Y-	y	121 (79)	249 (F9)
RIGHT X+	X	88 (58)	216 (D8)
LEFT X-	x	120 (78)	248 (F8)
UP Z+	Z	90 (5A)	218 (DA)
DOWN Z-	z	122 (7A)	250 (FA)
HOME	FF	12 (0C)	140 (8C)
RUN	R	82 (52)	210 (D2)
RESET	!	33 (21)	161 (A1)
BLOCK	%	37 (25)	165 (A5)
CYCLE1	a	97 (61)	225 (E1)
CYCLE2	b	98 (62)	226 (E2)
CYCLE3	c	99 (63)	227 (E3)
START	^C	03 (03)	131 (83)
STOP	^K	11 (0B)	139 (8B)
CE	DEL	127 (7F)	255 (FF)
ENTER	CR	13 (0D)	141 (8D)
0	0	48 (30)	176 (B0)
1	1	49 (31)	177 (B1)
2	2	50 (32)	178 (B2)
3	3	51 (33)	179 (B3)
4	4	52 (34)	180 (B4)
5	5	53 (35)	181 (B5)
6	6	54 (36)	182 (B6)
7	7	55 (37)	183 (B7)
8	8	56 (38)	184 (B8)
9	9	57 (39)	185 (B9)
+/-	-	45 (2D)	186 (AD)
.	.	46 (2E)	187 (AE)
HIDDEN KEY#1	FS	28 (1C)	188 (9C)
HIDDEN KEY#2	GS	29 (1D)	189 (9D)
HIDDEN KEY#3	RS	30 (1E)	190 (9E)
HIDDEN KEY#4	US	31 (1F)	191 (9F)

NOTE: The key release codes are identical to the key pressed codes except that the most significant bit in the code is a "1". Therefore, the following formula holds true:

Code for Key Release = Code for Key Press + 0x80 (hex)

Figure 1.4 OPS1200 Keyboard Key Codes

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CHAPTER 2

OPS1200 FIRMWARE COMMAND SET

This document provides additional command information for the Acroloop OPS1200 Display and Keyboard not currently included in the Acroloop Motion Controller User's Guide Part I.

Refer to the Acroloop Motion Controller User's Guide Part I for a complete listing of commands available for use with the ACR1200 Motion Control Board. The following commands are available in the User's Guide and may be useful when programming with the OPS1200 interface:

CLOSE	Close a device.
INPUT	Receive data from a device.
PRINT	Send data to a device.

OPEN

Open a device

Format: OPEN "device string" AS #device

Group: Character I/O

See also: PRINT, INPUT, CLOSE

This command opens a device. The valid range for "device" is 0 to 3. Each program has its own device #0 which is used as its default device. Devices #1 through #3 are board-wide system resources that can be opened and used from within any program or from any system or program prompt.

The "device string" describes the device that is to be opened. Serial device strings contain information required to set up communications. Valid device strings are:

```
"FIFO:"  
"COM1:baudrate,parity,databits,stopbits"  
"COM2:baudrate,parity,databits,stopbits"  
"OPS:" (Valid only when using an OPS1200 Display and  
Keyboard)
```

```
baudrate      = 300,600,1200,2400,9600,19200,38400  
parity        = N,E,O  
databits      = 5,6,7,8  
stopbits      = 1,2
```

When a device is opened, the operating system attached to that device enters an idle state, allowing incoming characters to be used by a program instead of being interpreted as commands. When the device is closed, the device will enter its auto-detect mode as if it were starting from power-up.

Usage example:

```
10 OPEN "COM1:9600,N,8,1" AS #1  
20 PRINT #1, "Hello world!"  
30 CLOSE #1
```

CLS (OPS1200 Display and Keyboard Only)

Clear the LCD screen

Format: CLS
Group: Character I/O
Units: none

See also: OPEN

This command will clear the LCD screen of the OPS-1200. Before this command is attempted, the OPS: device **MUST** have been opened using the “OPEN” command. The cursor is moved to location 0,0, which is the top left-hand corner of the display.

Usage example:

CLS

CONTRAST (OPS1200 Display and Keyboard Only)

Sets up the display viewing contrast

Format: CONTRAST +{value}
 CONTRAST – (value)

Group: Character I/O

Units: none

See also: CLS

This command modifies the display viewing contrast. The value increases (+) or decreases (-) the contrast level by increments of 1. The contrast value set is stored in non-volatile memory on the OPS1200 module.

The following example increments the contrast value by 3:

Usage example:

```
CONTRAST +3
```

TIMEOUT (OPS1200 Display and Keyboard Only)

Sets up the character input timeout value

Format: TIMEOUT #device, {value}

Group: Character I/O

Units: none

See also: INPUT, OPEN

This command sets up a timeout value to be used by the “INPUT” and “ON MENU” commands, in case no character is input within a specified period of time. The value is in 0.1-second increments. This command also flushes the input buffer of the device selected. The INPUT statement returns an error code of 34 if the timeout has expired. The INPUT statement also zeroes out the TIMEOUT value after using regardless if a timeout has occurred or not.

Therefore, if a timeout is needed on successive occasions, the TIMEOUT command must be used to set the timeout before the INPUT command.

The following example sets the input timeout value to 1 second for device #1:

Usage example:

```
TIMEOUT #1, 10
```

HPOS (OPS1200 Display and Keyboard Only)

Move the horizontal cursor position

Format: HPOS {value}

Group: Character I/O

Units: none

See also: VPOS, OPEN

This command moves the horizontal position of the cursor on the LCD screen after evaluating the expression. The value is a number from 0 to 39, in increments of 1. A “0” will place the cursor at the extreme LEFT of the 40 character screen.

Note that this command will only work if the OPS: device has been opened using the “OPEN” command.

The following example sets the cursor position to character space 2 from the left:

Usage example:

```
HPOS 1
```

VPOS (OPS1200 Display and Keyboard Only)

Move the vertical cursor position

Format: VPOS {value}

Group: Character I/O

Units: none

See also: HPOS, OPEN

This command allows moving the cursor on the LCD screen in the vertical direction. The value is a number from 0 to 3. The lines on the LCD screen are numbered from top to bottom as 0, 1, 2, and 3.

Note that this command will only work if the OPS: device has been opened using the “OPEN” command.

The following example sets the cursor position to the third LCD screen line:

Usage example:

```
VPOS 2
```

ON MENU GOSUB (OPS1200 Display and Keyboard Only)

Sets up the keypad for subroutines

Format: ON MENU GOSUB {list of 9 line numbers separated by commas}
Group: Character I/O
Units: none

See also: ON MENU GOTO

This command will automatically wait for the operator to press the function (F1 thru F9) or ABORT keys on the OPS1200 front panel. Then, depending on the key depressed, a GOSUB will be done to the corresponding line number specified in the list of line numbers. If the ABORT key or any other key except F1 thru F9 is depressed, the control will transfer to the NEXT line in the program. Even if the user is only trying to sense 2 or 3 keys, he or she must specify the entire list of 9 line numbers.

This command will only work if the OPS: device has been opened using the OPEN command.

The following example shows a program using the ON MENU GOSUB command and setup.

Usage example:

```
10 ON MENU GOSUB (100,200,300,400,500,600,700,800,900)
20 ? "FINISHED"
30 END

100 ? "100 OK"
110 RETURN

200 ? "200 OK"
210 RETURN

300 ? "300 OK"
310 RETURN

400 ? "400 OK"
410 RETURN

500 ? "500 OK"
510 RETURN

600 ? "600 OK"
610 RETURN

700 ? "700 OK"
710 RETURN

800 ? "800 OK"
810 RETURN

900 ? "900 OK"
910 RETURN
```


ON MENU GOTO (OPS1200 Display and Keyboard Only)

Sets up the keypad for GOTO statement

Format: ON MENU GOTO {list of 9 line numbers separated by commas}
Group: Character I/O
Units: none

See also: ON MENU GOSUB

This command will automatically wait for the operator to press the function (F1 thru F9) or ABORT keys on the OPS1200 front panel. Then, depending on the key depressed, a GOTO will be done to the corresponding line number specified in the list of line numbers. If the ABORT key or any other key except F1 thru F9 is depressed, the control will transfer to the NEXT line in the program. Even if the user is only trying to sense 2 or 3 keys, he or she must specify the entire list of 9 line numbers.

This command will only work if the OPS: device has been opened using the OPEN command.

The following example shows a program using the ON MENU GOTO command and setup.

Usage example:

```
10 ON MENU GOTO (100,200,300,400,500,600,700,800,900)
20 ? "ABORT"
30 END

70 ? "FINISHED"
80 GOTO 70

100 ? "100 OK"
110 GOTO 70

200 ? "200 OK"
210 GOTO 70

300 ? "300 OK"
310 GOTO 70

400 ? "400 OK"
410 GOTO 70

500 ? "500 OK"
510 GOTO 70

600 ? "600 OK"
610 GOTO 70

700 ? "700 OK"
710 GOTO 70

800 ? "800 OK"
810 GOTO 70

900 ? "900 OK"
910 GOTO 70
```

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CHAPTER 3

OPS1200 HARDWARE INTERCONNECTION

This section contains wiring diagram information for the Acroloop OPS1200 complete motion box.

Refer to the ACR1200 Hardware Manual for details on board connection, jumper selection, and technical data.

OPS1200 INTERCONNECT WIRING

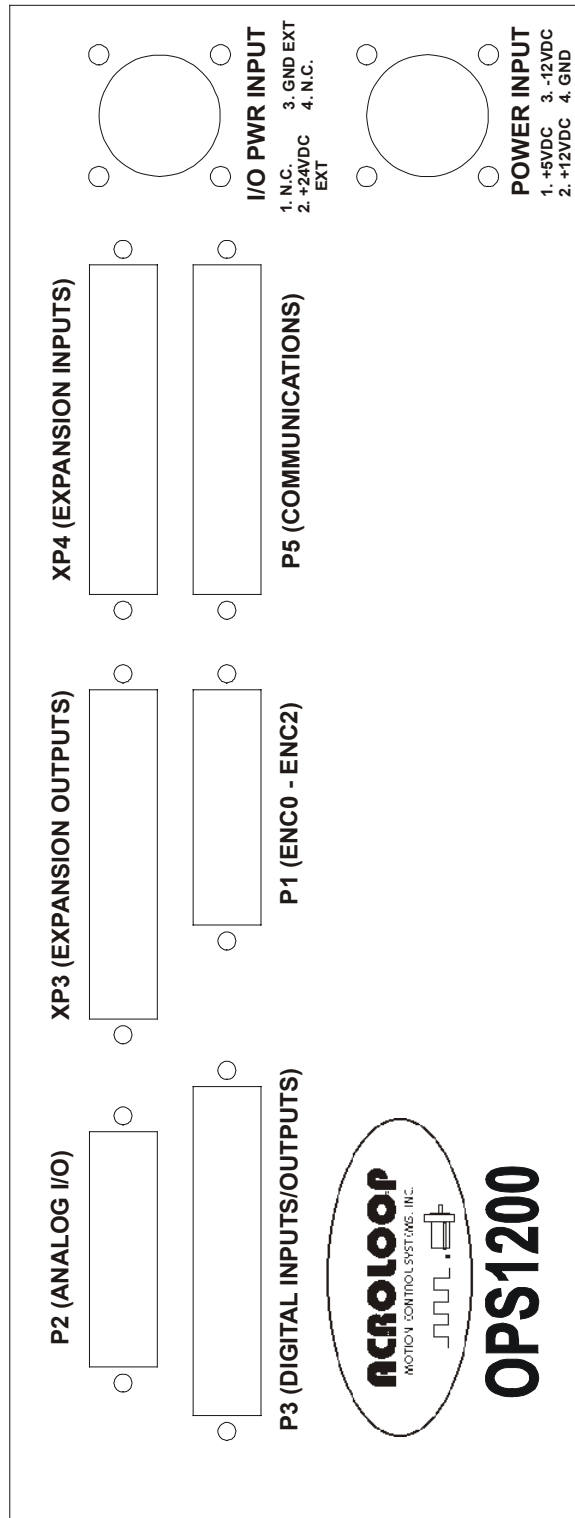


Figure 3.1 OPS1200 Interconnect Location Outline

OPS1200 INTERCONNECT WIRING

Encoder Inputs (P1)

There is one 25 pin D-sub provided on the OPS1200 for encoder feedback. The 25 pin D-sub connector provides up to three (3) axes of encoder feedback. Refer to Figure 1 for connector location.

Note: P1 is a 25-pin female D-sub.

P1			
Usage	Pin	Usage	Pin
CHA0	1	CHA0'	14
CHB0	2	CHB0'	15
MRK0	3	MRK0'	16
VCC	7	GND	17
CHA1	5	CHA1'	18
CHB1	6	CHB1'	19
MRK1	7	MRK1'	20
VCC	8	GND	21
CHA2	9	CHA2'	22
CHB2	10	CHB2'	23
MRK2	11	MRK2'	24
VCC	12	GND	25
N/C	13		

Table 3.1 OPS1200 Encoder Input Connector

OPS1200 INTERCONNECT WIRING

Analog Inputs/Outputs (P2)

The analog input/output connections are made through a 25-pin D-style connector on the OPS1200 motion control box. Refer to Figure 1 for connector location.

Note: P2 is a 25-pin D-Sub female connector.

P2				Module
Definition	Pin	Pin	Definition	
ASIG-0	1	14	AGND-0	None
STEP-0	2	15	DIR-0	
LCUR-0	3	16	SVCC	
ASIG-1	4	17	AGND-1	
STEP-1	5	18	DIR-1	
LCUR-1	6	19	SVCC	
AIN-0	7	20	AIN-1	ADC Module P6
AIN-2	8	21	AIN-3	
AIN-4	9	22	AIN-5	
AIN-6	10	23	AIN-7	
WD-COM	11	24	WD-NO	None
WD-COM	12	25	WD-NC	ADC Module
AGND	13			

Table 3.2 OPS1200 Analog I/O Connector

OPS1200 INTERCONNECT WIRING

Digital Inputs / Outputs (P3)

There is one 37 pin D-sub provided on the OPS1200 for digital I/O interface. The 37 pin D-sub is used for both the 16 Digital Inputs and 16 Digital Outputs. Refer to Figure 1 for connector location.

Note: P3 is a 37-pin female D-sub.

P3			
Usage	Pin	Usage	Pin
INP-00	1	INP-01	20
INP-02	2	INP-03	21
INP-04	3	INP-05	22
INP-06	4	INP-07	23
INP-08	5	INP-09	24
INP-10	6	INP-11	25
INP-12	7	INP-13	26
INP-14	8	INP-15	27
N/C	9	OUT-32	28
OUT-33	10	OUT-34	29
OUT-35	11	OUT-36	30
OUT-37	12	OUT-38	31
OUT-39	13	OUT-40	32
OUT-41	14	OUT-42	33
OUT-43	15	OUT-44	34
OUT-45	16	OUT-46	35
OUT-47	17	N/C	36
N/C	18	N/C	37
N/C	19		

Table 3.3 OPS1200 Digital I/O Connector

OPS1200 INTERCONNECT WIRING

Communications (P5)

There is one 37 pin header provided on the OPS1200 communications board for the 2 serial and 1 parallel communications ports. The two serial ports, COM1 and COM2, can be individually configured as RS-232 or RS-422 interfaces. Configuration of the COM ports is software selectable by the user. Refer to the ACR1200 Hardware Manual for details.

The following diagram shows the connections for the 3 communications ports. Refer to Figure 1 for connector location.

Note: P5 is a 37-pin female D-sub.

P5			
Usage	Pin	Usage	Pin
RXD1	1	TXD1	20
GND	2	MUX1	21
TXD1A	3	TXD1B	22
RXD1A	4	RXD1B	23
RXD2	5	TXD2	24
GND	6	MUX2	25
TXD2A	7	TXD2B	26
RXD2A	8	RXD2B	27
STB	9	AFD	28
ERR	10	INIT	29
SLIN	11	GND	30
PD0	12	PD1	31
PD2	13	PD3	32
PD4	14	PD5	33
PD6	15	PD7	34
ACK	16	BUSY	35
PE	17	SLCT	36
N/C	18	N/C	37
N/C	19		

Table 3.4 OPS1200 Communications Connector

OPS1200 INTERCONNECT WIRING

I/O Power Input(I/O PWR INPUT)

I/O PWR INPUT is the connection for the user supplied voltage for the Digital Inputs and Digital Outputs and should be wired to VEXT as shown in the table below. Refer to the ACR1200 Hardware Manual for fuse location and details.

Refer to Figure 1 for connector location.

Isolated voltage (VEXT) refers to +24VDC.

WARNING

Wiring VEXT with the incorrect voltage will permanently damage the Digital I/O circuitry. The isolated voltage (VEXT) is +24VDC.

Note: I/O PWR INPUT is a 4-pin male circular plug.

I/O PWR INPUT Isolated Power Connector		
Usage	Description	Pin
N/C	No Connection	1
+24VDC EXT	+24VDC Isolated Voltage (VEXT)	2
GND EXT	Isolated Common (GEXT)	3
N/C	No Connection	4

Table 3.5 OPS1200 Isolated Power Connector

OPS1200 INTERCONNECT WIRING

Power Input (POWER INPUT)

POWER INPUT is the connection for the standalone power supply to the OPS1200. Refer to the ACR1200 Hardware Manual for fuse location and details.

Refer to Figure 1 for connector location.

Note: POWER INPUT is a 4-pin male circular plug.

POWER PLUG Standalone Power Connector		
Usage	Description	Pin
+5VDC	Standalone +5VDC	1
+12VDC	Standalone +12VDC	2
-12VDC	Standalone -12VDC	3
GROUND	Standalone Ground	4

Table 3.6 OPS1200 Standalone Power Connector

OPS1200 INTERCONNECT WIRING

Auxiliary Digital Inputs / Outputs (XP3 / XP4)

Auxiliary Digital I/O is optional on the OPS1200.

There are two 37 pin D-sub connectors provided on the OPS1200 for the auxiliary digital I/O interface. One of the 37 pin D-sub connectors is used for the auxiliary 32 Digital Inputs and the second is used for the auxiliary 32 Digital Outputs.

Refer to Figure 1 for connector location.

Note: XP3 and XP4 are 37-pin female D-sub connectors.

XP3—Digital Outputs			
Usage	Pin	Usage	Pin
OUT-32	1	OUT-33	20
OUT-34	2	OUT-35	21
OUT-36	3	OUT-37	22
OUT-38	4	OUT-39	23
OUT-40	5	OUT-41	24
OUT-42	6	OUT-43	25
OUT-44	7	OUT-45	26
OUT-46	8	OUT-47	27
OUT-48	9	OUT-49	28
OUT-50	10	OUT-51	29
OUT-52	11	OUT-53	30
OUT-54	12	OUT-55	31
OUT-56	13	OUT-57	32
OUT-58	14	OUT-59	33
OUT-60	15	OUT-61	34
OUT-62	16	OUT-63	35
N/C	17	N/C	36
N/C	18	N/C	37
N/C	19		

Table 3.7 OPS1200 Auxiliary Digital Output Connector

OPS1200 INTERCONNECT WIRING

Digital Inputs / Outputs, Continued

XP4 -- Digital Inputs			
Usage	Pin	Usage	Pin
INP-00	1	INP-01	20
INP-02	2	INP-03	21
INP-04	3	INP-05	22
INP-06	4	INP-07	23
INP-08	5	INP-09	24
INP-10	6	INP-11	25
INP-12	7	INP-13	26
INP-14	8	INP-15	27
INP-16	9	INP-17	28
INP-18	10	INP-19	29
INP-20	11	INP-21	30
INP-22	12	INP-23	31
INP-24	13	INP-25	32
INP-26	14	INP-27	33
INP-28	15	INP-29	34
INP-30	16	INP-31	35
N/C	17	N/C	36
N/C	18	N/C	37
N/C	19		

Table 3.8 OPS1200 Auxiliary Digital Input Connector

CHAPTER 4
OPS1200 TECHNICAL SPECIFICATION

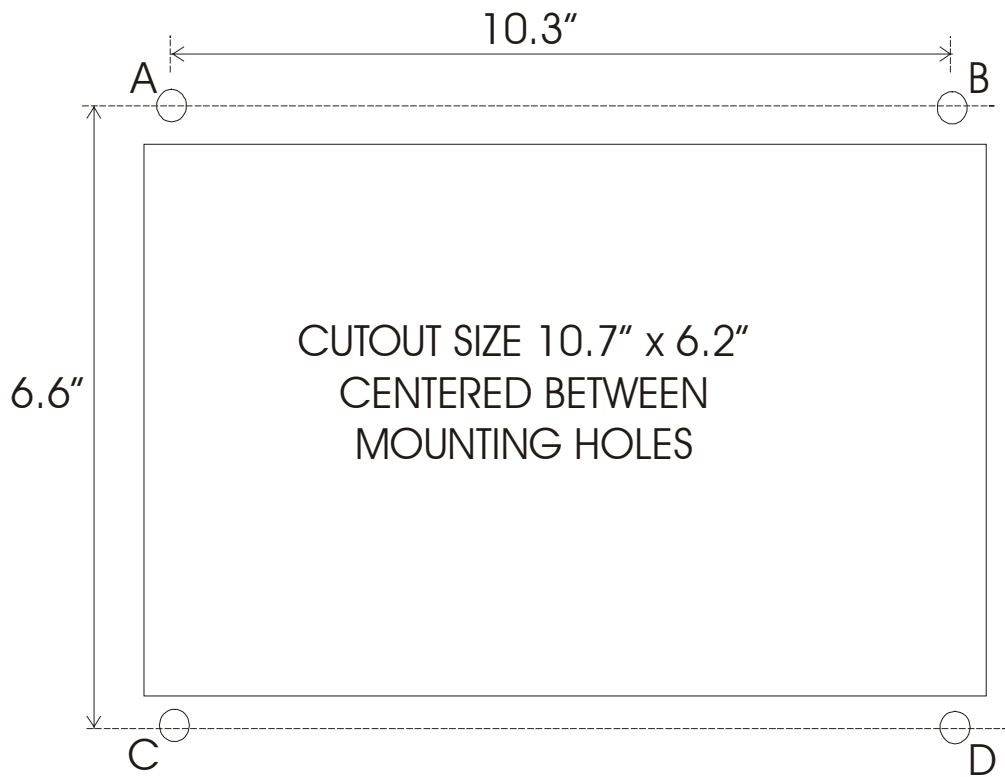
Technical Specification

ITEM	SPECIFICATION
External I/O Power Supply Requirements:	+5VDC +/- 0.2VDC @ 2A +12VDC +/- 0.5VDC @ 0.15A -12VDC +/- 0.5VDC @ 0.15A Note: Power consumption does not include any additional power required for external components (Encoders, Stepper Outputs, etc.).
Operating Temperature:	0°C to 50°C (32°F to 122°F)
Humidity:	0 to 95%, Non-Condensing
Size:	11" x 7" x 4.5"

See ACR1200 Hardware Manual for controller Technical Specification.

CHAPTER 5
OPS1200 MECHANICAL DRAWINGS

OPS1200 Mounting Information



Studs A thru D are #8, 1/2" long.

Figure 5.1 OPS1200 Mounting Diagram